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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,295	04/01/2004	Paul Thurk	040897-0115	6128
7590	10/04/2006			EXAMINER WON, BUMSUK
Stephen B. Maebius Foley & Lardner LLP Washington Harbour 3000 K Street, N.W., Suite 500 Washington, DC 20007-5143			ART UNIT 2879	PAPER NUMBER

DATE MAILED: 10/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/814,295	THURK ET AL.	
	Examiner Bumsuk Won	Art Unit 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 08 August 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 22-43 and 47-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 22-43 and 47-57 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ .  | 6) <input type="checkbox"/> Other: _____ .                        |

## **DETAILED ACTION**

### ***Response to Amendment***

The amendment filed on 8/8/2006 has been entered.

### ***Response to Arguments***

Applicant's arguments filed on 8/8/2006 have been fully considered but they are not persuasive.

Regarding the rejection of claims 47-49, and 51 under 35 U.S.C. 102(b), the Applicant argues that Bulovic does not teach each and every limitation of claim 47, specifically plural domains being disposed on the organic film. The Examiner respectfully disagrees. Bulovic discloses (para 27, for example) a plurality of domains disposed on an organic film.

Regarding the rejection of claims 22-26, 30-36, 38-40, and 52-56 under 35 U.S.C. 103(a), the Applicant argues that Korgel does not disclose a primary light is used to induce the emission of a secondary light. The Examiner respectfully agrees. However, the Examiner has used Srivastava as the prior art that teaches a primary light is used to induce the emission of a secondary light, and Korgel was used to satisfy the deficiency of Srivastava, the group IV semiconductor nanoparticles.

Regarding the rejection of claims 27-29 under 35 U.S.C. 103(a) on page 10, the Applicant argues that Isoda has different type of phosphors for emitting light. The Examiner respectfully agrees. However, the Examiner did not use for phosphor material, but has used Isoda for the primary light source being an infrared light source.

Regarding the rejection of claim 37 under 35 U.S.C. 103(a) on page 11, the Applicant argues that the motivation of combining Sudarhan with Srivastava in view of Korgel can not be

found in the disclosure. The Examiner notes that the motivation for combining does not need to be in the disclosure because it is generally available to one of the ordinary skill in the art.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 47-49, 51, and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Bulovic (US 2004/0023010).**

**Regarding claim 47,** Bulovic discloses a phosphor material comprising domains (figure 1, 3) disposed on an organic film (4), each domain comprising luminescent semiconductor nanoparticles having a monodisperse size distribution (paragraphs 27-28).

**Regarding claim 48,** Bulovic discloses the organic film has a luminescent nanoparticles dispersed therein (paragraphs 27-28).

**Regarding claim 49,** Bulovic discloses the luminescent nanoparticles dispersed in the organic film have a substantially monodisperse size distribution (paragraphs 27-28, for example).

**Regarding claim 51,** Bulovic discloses the domains have dimensions no more than about 100 microns (paragraph 37).

**Regarding claim 57,** Bulovic discloses the domains comprise a monolayer of nanoparticles (paragraph 16).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 22-26, 30-36, 38-40 and 52-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava (US 2003/0067265) in view of Korgel (US 2005/0266697).**

**Regarding claim 22,** Srivastava discloses a light-emitting device (figures 2, 5A, 5B, 5C, 6) comprising: a primary light source (1) which emits primary light (2); and a phosphor material (3), which absorbs a portion of the primary light and emits a secondary light (4), wherein the secondary light comprises a white light (paragraph 19).

Srivastava does not disclose the phosphor material comprising Group IV semiconductor nanoparticles.

Korgel discloses a light-emitting device using silicon nanoparticles to emit white light (paragraph 141), for the purpose of having high efficiency (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use silicon nanoparticles to emit white light disclosed by Korgel in the light-emitting device disclosed by Srivastava, for the purpose of having high efficiency.

**Regarding claim 23,** Srivastava discloses the primary light is blue light (paragraph 11).

**Regarding claim 24,** Srivastava discloses the primary light (paragraph 11) comprises wavelengths around 450 nm (blue) and the secondary light (white) has a lower energy than the primary light (blue).

**Regarding claim 25,** Srivastava discloses the primary light source is a blue light emitting diode (paragraph 15).

**Regarding claim 26,** Srivastava discloses the primary light source is a fluorescent lamp (paragraph 3).

**Regarding claim 30,** Korgel discloses the average diameter of the nanoparticles is 1 nm to 10 nm (paragraph 10). The reason for combining is the same as for claim 22 above.

**Regarding claim 31,** Srivastava in view of Korgel discloses the phosphor material has an emission profile comprising emission peaks in the green to red regions of the visible spectrum, since emission peaks in the green to red regions of the visible spectrum is an intrinsic property of the phosphor that is disclosed by Srivastava in view of Korgel.

**Regarding claim 32,** Srivastava in view of Korgel discloses the phosphor material has an emission profile comprising emission peaks in the blue to red regions of the visible spectrum, since emission peaks in the blue to the red regions of the visible spectrum is an intrinsic property of the phosphor that is disclosed by Srivastava in view of Korgel.

**Regarding claim 33,** Korgel discloses using silicon nanoparticles (paragraph 141). The reason for combining is the same as for claim 22 above.

**Regarding claim 34,** Korgel discloses using Ge nanoparticles (paragraph 126). The reason for combining is the same as for claim 22 above.

**Regarding claim 35,** Korgel discloses the nanoparticles comprises core-shell nanoparticles comprising a Group IV semiconductor core (paragraph 105) and an inorganic shell (paragraph 108). The reason for combining is the same as for claim 22 above.

**Regarding claim 36,** Korgel discloses the inorganic shell comprises ZnS or CdS (paragraph 108). The reason for combining is the same as for claim 22 above.

**Regarding claim 38,** Korgel discloses the core comprises Si and the shell comprises Ge (paragraphs 126-127). The reason for combining is the same as for claim 22 above.

**Regarding claim 39,** Korgel discloses the core comprises Ge and the shell comprises Si (paragraphs 126-127). The reason for combining is the same as for claim 22 above.

**Regarding claim 40,** Korgel discloses the nanoparticles are dispersed in a binder (paragraph 182). The reason for combining is the same as for claim 22 above.

**Regarding claim 52,** Korgel discloses the Group IV semiconductor is doped with impurities. The reason for combining is the same as for claim 22 above.

**Regarding claim 53,** Korgel discloses the nanoparticles are embedded in an inorganic binder (paragraph 182, for example). The reason for combining is the same as for claim 22 above.

**Regarding claim 54,** Korgel discloses the nanoparticles comprising SiGe alloy nanoparticles (paragraph 118). The reason for combining is the same as for claim 22 above.

**Regarding claims 55 and 56,** the light-emitting device having a color rendering index of at least 90 and having an efficiency of at least 30 lm/w are functional limitations which does not differentiate the structure of the prior art, therefore they do not have patentable weight (MPEP 2114). The reason for combining is the same as for claim 22 above.

**Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava (2003/0067265) in view of Korgel (US 2005/0266697), in further view of Isoda (US 2003/0186023).**

**Regarding claim 27,** Srivastava in view of Korgel discloses all of the claimed limitations except for the primary light source is an infrared light source and the secondary light has a higher energy than the infrared light.

Isoda discloses the primary light source is an infrared light source and the secondary light has a higher energy than the infrared light (paragraph 2), for the purpose of generating infrared light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the primary light source is an infrared light source and the secondary light has a higher energy than the infrared light disclosed by Isoda in the light emitting device disclosed by Srivastava in view of Korgel, for the purpose of generating infrared light.

**Regarding claim 28,** Srivastava discloses the primary light source is a red light emitting diode (paragraph 11).

**Claims 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava (2003/0067265) in view of Korgel (US 2005/0266697), in further view of Isoda (US 2003/0186023), in further view of Kashima (US 2004/0124352).**

**Regarding claim 29,** Srivastava in view of Korgel, in further view of Isoda discloses all of the claimed limitations except for the primary light source is a halogen lamp or an incandescent lamp.

Kashima discloses the primary light source is a halogen lamp or an incandescent lamp (paragraph 46), for the purpose of generating infrared light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a halogen lamp or an incandescent lamp for the primary light source disclosed

by Kashima in the light emitting device disclosed by Srivastava in view of Korgel, in further view of Isoda, for the purpose of generating infrared light.

**Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava (2003/0067265) in view of Korgel (US 2005/0266697), in further view of Sudarshan (US 2004/0105980).**

**Regarding claim 37,** Srivastava in view of Korgel discloses all of the claimed limitations except for the core comprise Si and the shell comprises Si<sub>3</sub>N<sub>4</sub> or SiC.

Sudarshan discloses a semiconductor core-shell structure wherein the core comprises Si and the shell comprises or SiC, for the purpose of protecting the core.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the core comprises Si and the shell comprises or SiC disclosed by Sudarshan in the light-emitting device disclosed by Srivastava in view of Korgel, for the purpose of protecting the core.

**Claims 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava (2003/0067265) in view of Korgel (US 2005/0266697), in further view of Shiang (US 2004/0027062).**

**Regarding claim 41,** Srivastava in view of Korgel discloses all of the claimed limitations except for the primary light source comprise an electroluminescent device.

Shiang discloses the primary light source comprises an electroluminescent device (paragraph 43), for the purpose of generating light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the primary light source comprises an electroluminescent device disclosed by

Shiang in the light emitting device disclosed by Srivastava in view of Korgel, for the purpose of generating light.

**Regarding claim 42,** Shiang discloses the primary light source comprises an organic light emitting material (paragraph 45). The reason for combining is the same as for claim 41 above.

**Regarding claim 43,** Shiang discloses the nanoparticles are dispersed in the organic light emitting material (paragraph 45). The reason for combining is the same as for claim 41 above.

**Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic (US 2004/0023010) in view of Singh (“Nanoparticulate Materials”, Materials Research Society, Warrendale, Pennsylvania) which is Applicant’s admitted prior art.**

**Regarding claim 50,** Bulovic discloses all of the claimed limitations except for using polydisperse size distribution luminescent nanoparticles.

Singh discloses using polydisperse size distribution nanoparticles for the phosphor material (page 20), for the purpose of exhibiting sharp luminescence at room temperature (page 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use polydisperse size distribution nanoparticles disclosed by Singh in the phosphor material disclosed by Bulovic, for the purpose of exhibiting sharp luminescence at room temperature.

### *Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

*Contact information*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bumsuk Won whose telephone number is 571-272-2713. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Bumsuk Won  
Patent Examiner



JOSEPH WILLIAMS  
PRIMARY EXAMINER